Participation in outdoor recreation in forested ecoprovinces in Canada in 1996

T. Williamson, R. Hoscheit, and H. Luttrell

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ABSTRACT

This report provides information on the level and distribution of participation in outdoor recreation in forested ecoprovinces in Canada. Such participation is an important indicator in the Canadian Council of Forest Ministers criteria and indicator framework. Forested ecoprovinces were defined on the basis of the National Ecological Framework for Canada. Particular ecoprovinces were designated as forested if over 30% of the total area had been inventoried and over 20% of the inventoried area was covered by forest. Information on levels of outdoor recreation participation within forested ecoprovinces was obtained from the National Survey on the Importance of Nature to Canadians—1996. Survey information was used to develop population estimates for recreation participation within ecoprovinces, and these estimates were tested for statistical validity and to determine if Statistics Canada release guidelines had been satisfied. According to these estimates Canadians spent over 225 million user days on various outdoor nature-based activities in 1996. About 195 million user days (86%) occurred in forested ecoprovinces. Sixty-five percent of the total user days within forested ecoprovinces occurred outside parks. The ecoprovinces with the highest levels of participation tended to be those with high population densities. For example, the Great Lakes–St. Lawrence Lowlands had the highest number of user-days, followed by the Southern Boreal Shield. However, on a per capita basis, remote ecoprovinces with distinctive terrain tended to be more attractive to recreationists. For example, the northwestern portions of British Columbia and the western portions of the Yukon had the highest per capita recreation participation, followed by the Columbia Montane Cordillera (Rocky Mountains) and the Lake of the Woods ecoprovince. The level of participation in outdoor nature-based activity in Canada is significant and encouragement of outdoor nature-based activities is therefore an important goal within sustainable forest management. The highest level of recreation activity occurs in ecoprovinces with high population densities, where competition for land is intense. Therefore, significant levels of human development do not preclude significant recreation participation. However, some types of outdoor recreation require higher levels of wilderness, naturalness, and a general lack of congestion. Canada's more remote and densely populated ecoprovinces are an important destination for individuals seeking these types of experiences.

RÉSUMÉ

Ce rapport contient des informations sur le niveau et la distribution de la participation aux activités de plein air dans les écoprovinces boisées du Canada. Cette participation est un important indicateur parmi ceux utilisés par le Conseil canadien des ministres des forêts. Les écoprovinces boisées ont été définies en fonction des critères propres au Cadre écologique national pour le Canada. Les écoprovinces sont ainsi considérées comme étant boisées si plus de 30 % de leur

superficie totale a été inventoriée et si plus de 20 % de la superficie inventoriée est boisée. Les données concernant la participation aux activités de plein air dans les écoprovinces proviennent de l'Enquête nationale de 1987 sur l'importance de la nature pour les Canadiens. Ces données ont été utilisées pour évaluer le niveau de participation aux activités récréatives en plein air dans les écoprovinces et la validité statistique de ces évaluations a été testée pour déterminer si les directives de Statistique Canada en matière de diffusion de données avaient été respectées. Ces évaluations indiquent qu'en 1996, les Canadiens ont passé plus de 225 millions de journées-utilisateurs à pratiquer des activités de plein air dans la nature. Près de 195 millions de journées-utilisateurs (86 %) ont été passées dans les écoprovinces boisées. Soixante-cinq pour cent du total des journées-utilisateurs dans les écoprovinces boisées ont été passées à l'extérieur des parcs. Les plus hauts niveaux de participation proviennent des écoprovinces affichant des densités de population élevées. C'est par exemple dans les basses terres des Grands lacs et du Saint-Laurent que le nombre de journées-utilisateurs est le plus élevé, suivis par le bouclier boréal sud. Les écoprovinces éloignées possédant une topographie distincte ont cependant été plus fréquentées par les amateurs de plein air si l'on s'en tient au rapport de la fréquentation par la population. Le Nord-Ouest de la Colombie-Britannique et l'Ouest du Yukon ont ainsi été le lieu de la plus grande participation par habitant, suivi par la cordillère montagnarde de la Columbia (montagnes Rocheuses) et l'écoprovince du lac des Bois. Le niveau de participation aux activités de plein air au Canada est élevé et la gestion forestière durable doit donc prendre en compte cet engouement des Canadiens. Le plus haut niveau de participation est associé aux écoprovinces ayant une forte densité démographique, où la terre fait l'objet d'une intense compétition. Des niveaux élevés de développement n'empêchent donc pas une participation importante aux activités de plein air. Certains types de loisirs en plein air nécessitent néanmoins une nature plus sauvage et une densité plus faible. Les écoprovinces canadiennes éloignées, peu peuplées, constituent une destination naturelle pour ceux qui recherchent ce type d'expériences.

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INTRODUCTION

Canadian forest policy is undergoing a transition from sustained-yield, multiple-use management to sustainable forest management (Ross 1995; Adamowicz and Veeman 1998). Strategic policy goals under sustainable forest management still consider the productive capacity of forests in relation to harvest rates (for example, see CCFM 2000). However, this form of management also requires maintaining the long-term health and resiliency of forest ecosystems and all biotic elements that are components of or interact with these ecosystems. It also entails preservation of environmental quality and consideration of the multiple benefits associated with forests (CCFM 1998). Therefore, sustainable forest management implies a stronger emphasis on maintaining ecological processes, biodiversity, and ecosystem resiliency, as well as a commitment to balanced consideration of timber benefits, nontimber benefits (including outdoor forest-based recreation), and impacts on human communities.

Another recent change is recognition of the public's desire for more information about Canada's forests and their uses and more accountability regarding how forests are managed. Therefore, mechanisms to measure, monitor, and provide higher levels of accountability with respect to forest management practices are being developed and implemented. Forest certification is one example of this trend; the development of national criteria and indicators (e.g., CCFM 2000) is another example. In almost all cases, reporting frameworks for sustainable forest management include reporting requirements for various nontimber values. An important category of nontimber value is outdoor forest-based recreation (for example, indicator 5.4.1, availability and use of recreational opportunities, in CCFM 2000).

Measures of recreation participation are relevant indicators of sustainable forest management for a number of reasons. First, the criteria and indicator report of the Canadian Council of Forest Ministers (CCFM 2000) showed that levels of participation in various types of outdoor recreation in forested areas are substantial. Therefore, outdoor recreation has a social value that should be reflected in decisions aimed at sustainable forest management. Equally important, however, is the fact that people's preferences for particular types of recreational opportunities are evolving over time. For example, participation (measured in terms of user-days) in some types of outdoor recreation (e.g., camping) is increasing, while participation in other types of activity (e.g., hunting) is decreasing (Filion et al. 1993; Cordell 1999). It is important to understand both the extent of the change in preferences for particular types of recreation and the underlying reasons for these changes. Recreation indicators are also relevant because outdoor recreation (or nature-based tourism) can have significant economic impacts in local economies. Finally, outdoor recreation can have negative environmental impacts, and these types of social costs should be considered in decisions related to land use.

Although measures of recreation participation are relevant indicators for sustainable forest management reporting, their interpretation is not straightforward. A particular level of recreation activity at a particular time is the result of both supply- and demand-related considerations. The supply of recreation destinations depends on combinations of natural amenities (such as forest characteristics) and the availability of privately or publicly funded facilities and services. Similarly, any number of demographic, sociological, economic, and institutional factors affect the demand for particular activities at a particular time. Therefore, although forest characteristics and forest management policies and practices can influence levels of recreation participation, many other considerations also affect these levels.

This report provides data on participation in outdoor recreation in Canada's forested ecoprovinces in 1996. In that year, more than 80% of the total number of days spent on nature-based

activities in Canada occurred within forested ecoprovinces (CCFM 2000). Therefore, the opportunity to travel to a destination within a forested area to participate in a nature-based activity is a significant forest value. Moreover, population growth and increases in per capita income point to increases in the demand for recreation opportunities in natural areas in the future.

The CCFM (2000) presented information on outdoor recreation activity in Canada at an aggregate level. The present report extends this analysis by presenting data on outdoor forest-based recreation activities for individual forested ecoprovinces in Canada. The source of the data is the National Survey on the Importance of Nature to Canadians—1996 (NSINC—1996) (for a general description, see Filion et al. 1999). The NSINC—1996 obtained detailed information on outdoor recreation activity in terms of both geographic origins of participants and destinations for visits. Therefore, the survey allowed determination of levels of participation at a regional level.

Importance of Canada's Forests as Destinations for Outdoor Recreation

Site and landscape attributes are important considerations in explaining recreation behavior (Clark and Downing 1984; Boxall et al. 1995; Siderelis and Moore 1998). The attributes or features affecting rates of participation for particular activities at particular sites include geographic features (e.g., rock outcrops and topography), overall esthetic quality, presence of lakes or rivers and their navigability, presence of beaches, shore quality, water quality (e.g., turbidity, bacterial counts, and temperature), population levels of fish and wildlife, accessibility, presence and quality of campground services and other facilities, congestion, unique or special features (e.g., waterfalls or rapids), presence of trails, local climate, conflicting uses (conflicts between recreation and other uses [e.g., harvesting versus nature study] or conflicts between recreational activities [e.g., all-terrain vehicles versus trail hiking or snowmobiling versus cross-country skiing]), and status and condition of vegetative cover.

Various combinations of these features contribute to the attractiveness of a site for particular combinations of activities. However, the characteristics and qualitative features of natural ecosystems in an area are especially important. Trees and forests are appealing to outdoor recreationists (Douglass 2000) because they provide solitude; tranquil, visually pleasing, and satisfying surroundings; opportunities to view or study wildlife; opportunities to hunt and fish; and opportunities to be self-reliant and to escape the conveniences of modern lifestyles. A forest setting may also be a secondary factor in choices to participate in outdoor recreation (Douglass 2000). For example, forests contribute to clean water, and clean water in lakes and rivers is appealing to people interested in water-oriented activities such as canoeing, boating, fishing, and swimming. Because forest management affects the properties of forests (or at least public perceptions regarding forest properties) and since these changes can in turn affect recreation participation, it is important that forest policies and management practices take into account these potential impacts.

Applications of the Analysis

The information in this report represents a baseline against which future levels of recreation activity in forested ecoprovinces can be compared. Having a baseline of recreation activity levels for individual ecoprovinces will make it possible to determine trends in outdoor recreation at a more geographically disaggregated level than has previously been possible.

This report also identifies forested ecoprovinces where levels of outdoor recreation activity are particularly high. A high activity level has both positive and negative implications in terms of sustainable forest management and environmental quality. On the positive side, high participation rates indicate that the demand for outdoor recreation in the ecoprovince is strong and that there is a significant supply of outdoor recreation sites. Conversely, high activity levels may also indicate that the recreational services provided by natural systems in an area are being overexploited.

Some authors have suggested that the recreational services offered by forests have characteristics of open-access resources (Lindberg 1991; Steel 1995). Such resources are typically exploited by users until rents are fully dissipated. In the case of an open-access recreation resource, recreationists would continue to be drawn to the area until the rents from the recreation activity were dissipated. The expected consequences of open-access resources are overexploitation of recreation resources (i.e., too many recreationists on a site or in an area), decreased quality of recreation attributes (manifested, for example, by congestion, reduced hunting success, reduced sightings of wildlife, increased incidence of forest fires, trail degradation, littering, and noise pollution), and depressed incomes and wages for recreation service providers (e.g., guides, lodges and hotels, and tour operators) or lower net benefits accruing to recreationists because of diminished quality of experiences.

Finally, the information in this report can be used to extend natural resource accounting to reflect the capital asset value of forests as a generator of services for outdoor recreation activity. In general terms, the value of a capital asset is the present value of the future flow of income or benefit provided by the asset. Natural resource accounting is a method for determining the capital asset value of natural resources such as forests. According to one view of sustainability, if the combined levels of natural resources and human-produced capital stocks are maintained, then the economy is sustainable (Solow 1999). Traditionally, the problem with natural resource accounting is that, although information on capital asset values pertaining to commercial resources such as timber is relatively easy to obtain, the capital asset value of forests as providers of nonmarket benefits such as recreation opportunities is generally unavailable. The annual flow of particular activities for a defined region is one piece of information required for development of a capital account for forest assets.

CATEGORIES OF OUTDOOR RECREATION

Categorizing recreation trips according to specific categories of activities presents a challenge because people may engage in a range of different activities on a single trip, and it may be difficult for them to identify a single primary purpose for each trip. Moreover, different combinations of activities may occur on different trips. For example, a person might camp, swim, photograph nature, and fish on a backcountry hiking trip, and then canoe, gather berries, take day hikes, swim, and study wildlife during a camping visit to a provincial campground. Within the NSINC—1996, respondents were asked to assign each destination-based trip to one of four broad but relatively distinct categories, according to the primary purpose of the trip. The four categories were general outdoor activities, wildlife study, fishing, and hunting.

General outdoor activities were described as including sightseeing, general photography of natural areas, gathering, picnicking, camping, swimming and beach visits, canoeing, kayaking, sailing, power-boating, hiking and backpacking, climbing, horseback riding, cycling, off-road vehicle use, downhill skiing, cross-country skiing, snowmobiling, and relaxing in outdoor settings. Wildlife study included watching wildlife (e.g., bird-watching), feeding wildlife, wildlife photography, and other forms of studying wildlife. Fishing encompassed all types of sport fishing, including freshwater fishing and ocean fishing. Hunting included hunting waterfowl, upland birds, small game, and large game. This report is based on these four categories of activities.

Outdoor recreation activities can also be differentiated on the basis of the nature of the inputs to the recreation experience. For example, some types of wilderness recreation depend on access to relatively pristine natural areas where there is no or relatively limited evidence of human development or human presence (Kline 2001). The areas

supporting this type of activity are remote and characterized by low population density and limited access by motorized vehicle. These experiences tend to involve high levels of self-sufficiency and personal effort on the part of the recreationists in terms of obtaining information about the area, navigating the area, (perhaps by backcountry hiking, canoeing, climbing, or horseback riding), supplying provisions, and arranging accommodation (generally tents). In these areas, recreationists tend to be dispersed, and recreation services and facilities are either nonexistent or primitive.

A different type of recreation experience is one that relies on purchasing a significant portion of the inputs by which the individual obtains value from the experience. Here, natural features are still vital to the recreation experience, but the demand for a nature-based experience leads to a derived demand for other services such as paved roads, drive-in campgrounds, hotels, restaurants, grocery stores, equipment rental facilities, guides, maintained day-use areas, and developed trails. For these types of experiences, recreation activities are often concentrated in defined areas (such as a camping site, park, beach or visitation site) where there is some special or unique feature attracting recreationists. In this case, the population density and level of development of the surrounding area and pervasive evidence of human activity may be less of a deterrent to recreationists.

CANADA'S FORESTED ECOPROVINCES

National Ecological Framework for Canada

The National Ecological Framework for Canada is a hierarchical framework with seven levels of ecological land classification. From largest to smallest, these levels are ecozones, ecoprovinces, ecoregions, ecodistricts, ecosections, ecosites, and ecoelements (Ecological Stratification Working Group 1995). The web site for the National Ecological Framework for Canada (Marshall and Schut 1999) provides more detailed information on ecological areas for the top four levels. Each area is viewed as a distinct system of interacting attributes or elements. For broad levels of classification (e.g., ecozones), the attributes or features are broadly defined. Lower levels of classification are defined in terms of increasingly specific sets of elements or characteristics.

Canada is divided into 15 terrestrial ecozones, the most generalized level of the ecological framework (Ecological Stratification Working Group 1995). Ecozones broadly describe the characteristics of large spatial units, such as climate, human activity, vegetation, soils, and geologic and physical features. The number and exact nature of these characteristics vary from one ecozone to another because of the large area encompassed by each of the ecozones (Wiken et al. 1996). Ecosystem specialists have assessed the dominant properties of a particular area to determine the boundaries of the ecozones. These properties may occur naturally or may be affiliated with human activities (Wiken et al. 1996).

Each ecozone is divided into a number of ecoprovinces, and Canada has a total of 53 ecoprovinces (Fig. 1, Table 1). Ecoprovinces are delineated on the basis of more detailed characteristics, including major aggregates of landforms, vegetation, hydrology, soil, and microclimate.

An ecoprovince is a spatial unit defined within the National Ecological Framework for Canada (Ecological Stratification Working Group 1995; Marshall and Schut 1999), which was developed in response to the emerging need to map and monitor ecosystems with standardized and generally agreed upon definitions. This emerging need resulted, in turn, from recent changes in management approaches (which entail greater emphasis on the health, resiliency, and function of ecological units) and a stronger commitment to environmental monitoring and reporting in Canada.

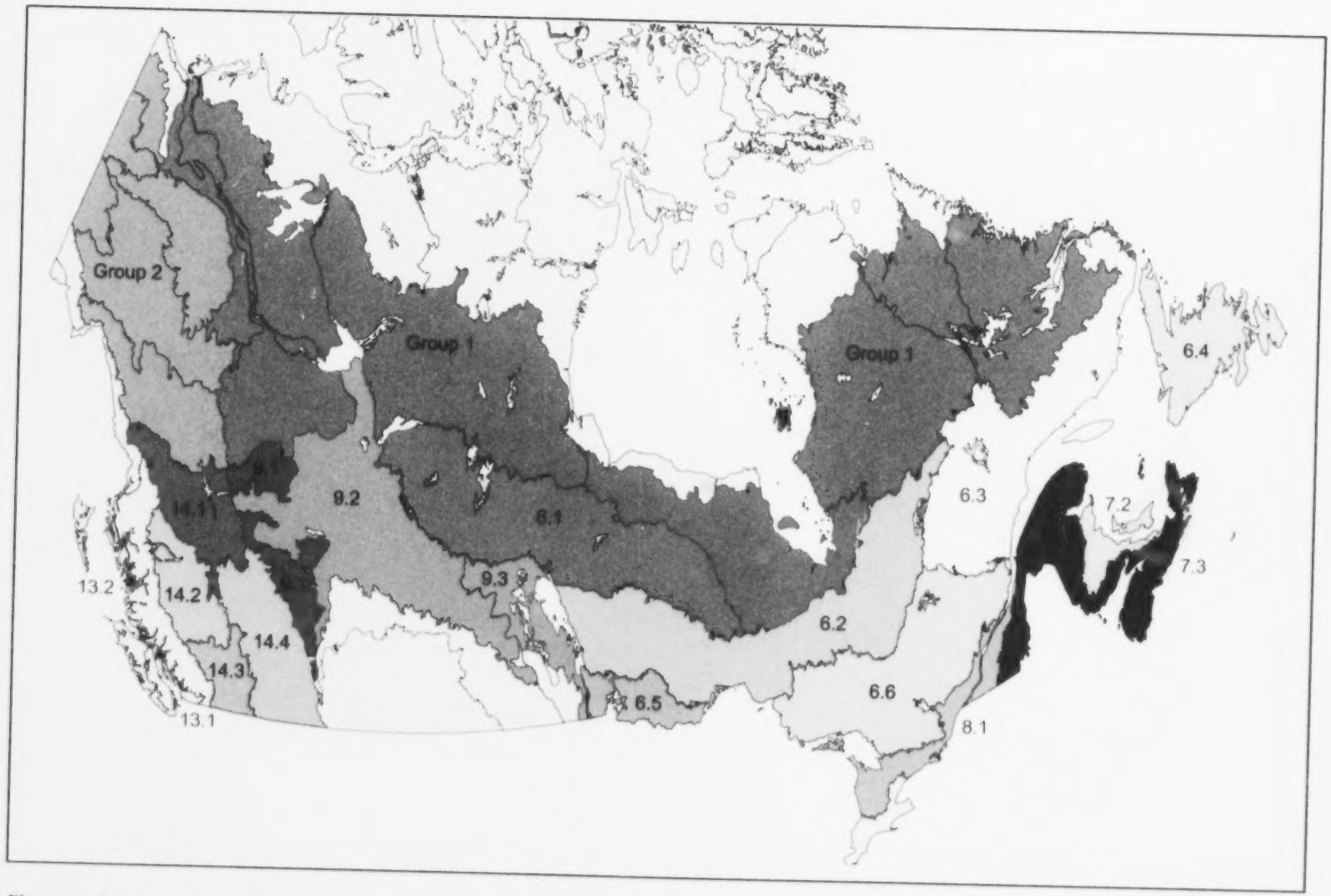

Figure 1. Forested ecoprovinces in Canada. See Table 1 for ecoprovince names corresponding to the numeric codes. Group 1 = ecoprovinces 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4, and 15.2. Group 2 = ecoprovinces 11.2, 11.3, 11.4, 12.2, 12.3, and 12.4.

Table 1. Numeric codes and names for ecoprovinces as defined within the classification system for Canadian terrestrial ecosystems

Code	Name	Code	Name
1.1	Northern Arctic Cordillera	7.3	Fundy Uplands
1.2	Southern Arctic Cordillera	8.1	Great Lakes–St. Lawrence Lowlands
2.1	Sverdrup Islands	8.2	Huron–Erie Plains
2.2	Ellesmere Basin	9.1	Boreal Foothills
2.3	Victoria Lowlands	9.2	Central Boreal Plains
2.4	Parry Channel Plateaux	9.3	Eastern Boreal Plains
2.5	Boothia–Foxe Shield	10.1	Eastern Prairies
2.6	Baffin Uplands	10.2	Parkland Prairies
2.7	Foxe–Boothia Lowlands	10.3	Central Grasslands
3.1	Amundsen Lowlands	11.1	Northern Yukon Mountains
3.2	Keewatin Lowlands	11.2	Old Crow–Eagle Plains
3.3	Ungava–Belcher	11.3	Ogilvie Mountains
4.1	Mackenzie Foothills	11.4	Mackenzie–Selwyn Mountains
4.2	Great Bear Lowlands	12.1	Wrangel Mountains
4.3	Hay–Slave Lowlands	12.2	Northern Boreal Cordillera
5.1	Western Taiga Shield	12.3	Southern Boreal Cordillera
5.2	Eastern Taiga Shield	12.4	Western Boreal Cordillera
5.3	Labrador Uplands	13.1	Georgia Depression
5.4	Whale River Lowland	13.2	Southern Coastal Mountains
6.1	Western Boreal Shield	13.3	Northern Coastal Mountains
6.2	Mid-Boreal Shield	14.1	Northern Montane Cordillera
6.3	Eastern Boreal Shield	14.2	Central Montane Cordillera
6.4	Newfoundland	14.3	Southern Montane Cordillera
6.5	Lake of the Woods	14.4	Columbia Montane Cordillera
6.6	Southern Boreal Shield	15.1	Hudson Bay Coastal Plains
7.1	Appalachian–Acadian Highlands	15.2	Hudson–James Lowlands
7.2	Northumberland Lowlands		

Source: Ecological Stratification Working Group (1995).

Designation of Forested Ecoprovinces

For the purpose of this anaylsis, characterization of ecoprovinces as forested or nonforested was based on the total area inventoried and the percentage of inventoried land covered by forest; these data were taken from the Canadian Forest Inventory database. Ecoprovinces were designated as forested if the total area inventoried was greater than 30%, and the percentage of inventoried land covered by forest was greater than 20% (Table 2). All other ecoprovinces were designated as nonforested. However, an exception was made for the Hudson–James Lowlands. Only about 29% of this ecoprovince has been inventoried, but there is little doubt that portions of the ecoprovince that have not been inventoried do in fact have forest cover. Therefore, it has been designated as forested.

Features of Forested Ecoprovinces

Forested ecoprovinces were described on the basis of selected statistical characteristics, including area, population, precipitation, and temperature (Table 3).

The Western Taiga Shield, located primarily in the Northwest Territories and spilling over into northern Manitoba, Saskatchewan, and Alberta, has the greatest total area, at over 62 million ha. This

Table 2. Designation of forested and nonforested ecoprovinces

Code	Name	Area inventoried (% of total)[a]	Area forested (% of inventoried area)	Designation
1.1	Northern Arctic Cordillera	0	No inventory	Nonforested
1.2	Southern Arctic Cordillera	6.43	6.74	Nonforested
2.1	Sverdrup Islands	0	No inventory	Nonforested
2.2	Ellesmere Basin	0	No inventory	Nonforested
2.3	Victoria Lowlands	0	No inventory	Nonforested
2.4	Parry Channel Plateaux	0	No inventory	Nonforested
2.5	Boothia–Foxe Shield	0	No inventory	Nonforested
2.6	Baffin Uplands	0	No inventory	Nonforested
2.7	Foxe–Boothia Lowlands	0	No inventory	Nonforested
3.1	Amundsen Lowlands	27.58	43.66	Nonforested
3.2	Keewatin Lowlands	3.32	4.17	Nonforested
3.3	Ungava–Belcher	0.02	72.74	Nonforested
4.1	Mackenzie Foothills	101.01	77.63	Forested
4.2	Great Bear Lowlands	94.84	89.58	Forested
4.3	Hay–Slave Lowlands	97.61	89.14	Forested
5.1	Western Taiga Shield	72.09	61.95	Forested
5.2	Eastern Taiga Shield	83.40	53.10	Forested
5.3	Labrador Uplands	90.12	73.36	Forested
5.4	Whale River Lowland	89.09	38.26	Forested
6.1	Western Boreal Shield	97.88	90.66	Forested
6.2	Mid–Boreal Shield	100.11	96.98	Forested
6.3	Eastern Boreal Shield	99.90	96.92	Forested

Table 2. Continued

Code	Name	Area inventoried (% of total)[a]	Area forested (% of inventoried area)	Designation
6.4	Newfoundland	97.09	59.94	Forested
6.5	Lake of the Woods	102.89	90.41	Forested
6.6	Southern Boreal Shield	97.55	95.59	Forested
7.1	Appalachian–Acadian Highlands	115.59	88.76	Forested
7.2	Northumberland Lowlands	99.06	76.88	Forested
7.3	Fundy Uplands	98.16	79.71	Forested
8.1	Great Lakes–St. Lawrence Lowlands	86.41	38.28	Forested
8.2	Huron–Erie Plains	98.76	14.36	Nonforested
9.1	Boreal Foothills	100.29	88.54	Forested
9.2	Central Boreal Plains	96.52	74.06	Forested
9.3	Eastern Boreal Plains	112.00	72.74	Forested
10.1	Eastern Prairies	102.08	16.53	Nonforested
10.2	Parkland Prairies	47.62	17.36	Nonforested
10.3	Central Grasslands	3.46	17.27	Nonforested
11.1	Northern Yukon Mountains	99.81	7.09	Nonforested
11.2	Old Crow–Eagle Plains	100.00	51.83	Forested
11.3	Ogilvie Mountains	100.00	42.03	Forested
11.4	Mackenzie–Selwyn Mountains	100.80	28.83	Forested
12.1	Wrangel Mountains	102.43	11.99	Nonforested
12.2	Northern Boreal Cordillera	100.77	77.06	Forested
12.3	Southern Boreal Cordillera	102.46	44.52	Forested
12.4	Western Boreal Cordillera	100.55	82.21	Forested
13.1	Georgia Depression	84.09	46.64	Forested
13.2	Southern Coastal Mountains	94.12	56.88	Forested
13.3	Northern Coastal Mountains	102.22	15.91	Nonforested
14.1	Northern Montane Cordillera	103.15	75.03	Forested
14.2	Central Montane Cordillera	98.61	80.25	Forested
14.3	Southern Montane Cordillera	97.10	77.89	Forested
14.4	Columbia Montane Cordillera	101.13	64.82	Forested
15.1	Hudson Bay Coastal Plains	0	No inventory	Nonforested
15.2	Hudson–James Lowlands	28.84	83.17	Forested

[a]In some cases the percent of area inventoried slightly exceeds 100%. This may be due to minor variances in area statistics and differences in services of area statistics. If percent area inventoried exceeds 100% it should be assumed that the area inventoried is equal to 100%.

Source: Special compilation of data from the National Forest Inventory of the Canadian Forest Service.

forested ecoprovince encompasses approximately 10% of the total forested land in Canada. The total area of the Western Taiga Shield is approximately 32 times larger than that of the smallest forested ecoprovince, the Georgia Depression.

The Eastern Boreal Plains has the largest proportion of surface covered by water (approximately 35%). The Ogilvie Mountains ecoprovince has the smallest proportion of surface covered by water (0.78%).

According to 1996 Census data, the Great Lakes–St. Lawrence Lowlands had the largest population of all the forested ecoprovinces, with just over 8 million people. This ecoprovince contains the cities of Montréal, Ottawa, and Québec. The Ogilvie Mountains ecoprovince had the lowest 1996 population level (164 people).

Population density is another characteristic used to describe forested ecoprovinces. The Georgia Depression, which includes the cities of Vancouver and Victoria, had the highest 1996 population density (0.74 ha/person). The Mackenzie–Selwyn Mountains ecoprovince had the lowest 1996 population density (more than 47 000 ha/person).

Precipitation includes all types of moisture, in particular rainfall and snowfall. The Southern Coastal Mountains, located on the west coast of British Columbia, has the highest annual precipitation of all the ecoprovinces, most (94%) of which falls as rain. The Old Crow–Eagle Plains ecoprovince has the lowest annual precipitation and the lowest annual rainfall of the forested ecoprovinces. The Labrador Uplands, located in Newfoundland, has the most annual snowfall and the Georgia Depression the least annual snowfall.

The Great Bear Lowlands has the lowest mean annual minimum temperature (-16.2°C), and the Old Crow–Eagle Plains ecoprovince has the lowest mean annual maximum temperature (-4.6°C). These ecoprovinces are located in two of the northernmost areas of the country (Fig. 1). The Georgia Depression has the highest mean annual minimum temperature (4.6°C), and the Southern Montane Cordillera, located in the Okanagan area of British Columbia and including the cities of Vernon, Kelowna, and Penticton, has the highest mean annual maximum temperature (15.2°C).

LEVELS OF RECREATION PARTICIPATION IN FORESTED ECOPROVINCES

The ideal way to evaluate and interpret rates of participation in outdoor recreation relative to the goals of sustainable forest management would be to compare actual rates of participation with some estimate of the socially optimal rate. However, such benchmarks are not available, particularly at aggregated levels. Therefore, explicit assessment of whether observed participation rates are socially optimal or consistent with sustainable forest management is impossible. Nevertheless, information on the level of participation in particular types of outdoor recreation at the ecoprovince scale can be a useful indicator. For example, a high level of participation in an ecoprovince indicates that aggregate recreation demand is high and that the social value of outdoor recreation is high. Also, an increase in recreation participation in an ecoprovince over time indicates that the demand for outdoor recreation is increasing.

The analysis of participation in outdoor recreation activities presented here is based on original data from NSINC—1996, a survey conducted by Statistics Canada on behalf of the Federal–Provincial–Territorial Task Force on the Importance of Nature to Canadians. The methodology for tabulations of population estimates at the ecoprovince level is described in Appendix 1.

The data in this report encompass total number of user-days and user-days per capita at destination ecoprovinces. However, these measures do not

Table 3. Features of forested ecoprovinces

Code	Name	Total area (ha)	Water (% of total area)	1996 population
4.1	Mackenzie Foothills	8 593 186.0	2.33	350
4.2	Great Bear Lowlands	33 153 640.3	23.02	5 663
4.3	Hay–Slave Lowlands	23 465 709.7	10.52	21 383
5.1	Western Taiga Shield	62 799 718.8	29.94	26 046
5.2	Eastern Taiga Shield	39 250 559.6	15.79	6 883
5.3	Labrador Uplands	24 822 031.4	16.09	5 269
5.4	Whale River Lowland	11 309 806.4	12.63	3 806
6.1	Western Boreal Shield	52 807 833.8	21.23	80 877
6.2	Mid-Boreal Shield	51 913 416.4	15.00	304 092
6.3	Eastern Boreal Shield	37 389 757.9	12.50	402 626
6.4	Newfoundland	11 044 185.3	12.00	525 313
6.5	Lake of the Woods	7 512 237.9	18.69	195 422
6.6	Southern Boreal Shield	33 084 243.6	15.91	1 571 257
7.1	Appalachian–Acadian Highlands	10 655 004.0	13.56	877 004
7.2	Northumberland Lowlands	3 504 425.9	1.20	589 255
7.3	Fundy Uplands	7 226 882.0	3.19	1 099 237
8.1	Great Lakes–St. Lawrence Lowlands	12 728 661.8	32.83	8 327 027
9.1	Boreal Foothills	12 044 162.3	1.42	82 787
9.2	Central Boreal Plains	48 470 908.2	5.25	535 622
9.3	Eastern Boreal Plains	13 213 586.0	34.71	115 002
11.2	Old Crow–Eagle Plains	2 055 112.9	13.07	450
11.3	Ogilvie Mountains	5 964 141.2	0.78	164
11.4	Mackenzie–Selwyn Mountains	15 852 595.3	1.07	336
12.2	Northern Boreal Cordillera	23 768 454.2	5.24	27 837
12.3	Southern Boreal Cordillera	16 731 345.3	1.82	6 668
12.4	Western Boreal Cordillera	3 845 414.2	3.08	1 586
13.1	Georgia Depression	1 925 548.0	4.68	2 605 929
13.2	Southern Coastal Mountains	15 660 894.0	3.24	255 628
14.1	Northern Montane Cordillera	14 062 285.3	3.76	129 967
14.2	Central Montane Cordillera	10 559 333.1	5.87	70 182
14.3	Southern Montane Cordillera	5 856 835.9	2.84	419 688
14.4	Columbia Montane Cordillera	18 311 105.6	1.98	248 926
15.2	Hudson–James Lowlands	31 022680.5	6.48	16 430
	Minimum value	1 925 548.0		164
	Median value	14 062 285.3		82 787
	Maximum value	62 799 718.8		8 327 027

Source: Ecological attributes database for the National Ecological Framework (Marshall et al. 1999).

Table 3. Continued

Population density (ha/person)	Total annual precipitation (mm)	Mean annual temperature (°C)	
		Minimum	Maximum
24 551.96	309.80	-13.0	1.2
5 854.43	291.88	-16.2	2.1
1 097.40	376.84	-9.7	6.1
2 411.11	360.11	-15.7	2.7
5 702.54	663.33	-10.3	4.0
4 710.96	898.66	-9.0	5.1
2 971.57	534.40	-10.3	0.1
652.94	524.46	-9.9	6.7
170.72	759.27	-8.4	7.6
92.86	1 014.26	-7.0	7.5
21.02	1 263.31	-2.6	9.8
38.44	671.55	-4.6	8.3
21.06	939.95	-5.0	10.5
12.15	1 063.07	-3.6	10.1
5.95	1 110.79	-1.4	10.8
6.57	1 357.36	-1.6	12.3
1.53	951.17	-0.5	11.9
145.48	511.49	-7.2	9.6
90.49	441.36	-8.7	8.6
114.90	491.44	-6.4	8.1
4 566.92	221.47	-15.2	-4.6
36 366.71	248.08	-15.2	2.3
47 180.34	372.91	-12.8	2.7
853.84	366.74	-12.4	4.9
2 509.20	459.38	-9.5	5.8
2 424.60	323.21	-12.6	2.4
0.74	1 533.75	4.6	14.0
61.26	2 327.63	2.3	14.6
108.20	682.99	-5.2	10.9
150.46	637.92	-2.6	14.4
13.96	445.38	0.9	15.2
73.56	694.85	-4.5	13.0
1 888.17	681.22	-9.9	5.4
0.74	221.47	-16.2	-4.6
150.46	637.92	-8.4	7.6
47 180.34	2 327.63	4.6	15.2

represent the complete set of indicators for reporting on outdoor recreation. Other relevant measures include the economic value of experiences, number of trips, expenditures, and number of participants who participate for a minimum of one day. For some of these indicators, information aggregated at the national level is not available. In other cases the indicators are available in other reports. For example, indicator information on expenditures and number of participants can be found in Filion et al. (1999) and the Federal–Provincial–Territorial Task Force on the Importance of Nature to Canadians (2000).

Table 4 presents a number of findings regarding outdoor recreation in forested ecoprovinces. First, in aggregate, forested ecoprovinces accounted for a significantly higher proportion of outdoor recreation user-days than nonforested ecoprovinces. This result is not surprising, given that nearly half of Canada's land area is forested (CCFM 1998) and also that most of Canada's population resides within forested ecoprovinces (see Table 5). General outdoor activities accounted for the majority of user-days. Again, this is not surprising because this category encompasses a broad range of activities. Conversely, wildlife study, fishing, and hunting are relatively specialized. What is particularly interesting about the data on user-days is that although parks and protected areas accounted for significant levels of participation, the majority of activity occurred outside these areas. For example, 60.8% of total user-days (i.e., 87 million days) spent on general outdoor activities were spent at destinations outside parks and protected areas. This result confirms the need for forest management policies, land-use planning approaches, and public consultation mechanisms that explicitly account for the social benefits generated by outdoor recreation activity. In general, institutional mechanisms to accommodate these requirements for public forest areas outside formal parks are in place in all jurisdictions within Canada. However, there is a continuing need to understand the value of various recreation experiences, the environmental costs related to recreation activity, and how changes in particular forest properties and resource management practices affect recreation values. There is also a need to update resource policies, land-use plans, and outdoor recreation management budgets as better information becomes available.

One question that can be addressed with the regional data supplied here is whether outdoor recreationists are attracted more to forested areas than to nonforested areas. As indicated in Table 5, in 1996 about 64% of Canada's population resided within ecoprovinces designated as forested. However, the percentage of outdoor recreation activities in forested ecoprovinces was much higher, ranging from 77.5% for wildlife study to 88.4% for hunting. This result suggests that forested areas generally offer more opportunities for outdoor recreation, perhaps because there is a higher proportion of public land in forested ecoprovinces to which recreationists have rights of access.

Table 6 shows the distribution of user-days of outdoor recreation by forested ecoprovince, and these data can be analyzed with respect to the features of the various ecoprovinces (Ecological Stratification Working Group 1996). The ecoprovinces with the highest levels of recreation activity in 1996 were the Great Lakes–St. Lawrence Lowlands (46.4 million user-days), the Southern Boreal Shield (39.1 million user-days), and the Georgia Depression (17.6 million days).

The Great Lakes–St. Lawrence Lowlands extends from Manitoulin Island on Lake Huron in the west through the Ottawa River and St. Lawrence River lowlands to Québec in the east (Fig. 1). The dominant land use in this ecoprovince is agriculture, but there are also extensive areas of forest cover. Warm summers and mild to cold winters with high levels of snow accumulation characterize the climate of the region. The most prominent forest species are sugar maple (*Acer saccharum*), yellow birch (*Betula alleghaniensis*), eastern hemlock (*Tsuga canadensis*), and eastern white pine (*Pinus strobus*). Other species include poplar (*Populus* spp.), red oak (*Quercus rubra*), beech (*Fagus* spp.), red maple (*Acer rubrum*), white spruce (*Picea glauca*), black ash (*Fraxinus nigra*), tamarack (*Larix laricina*), red pine (*Pinus resinosa*), elm (*Ulmus*

Table 4. Level of participation in outdoor recreation in 1996

	No. of user-days (% of total)								
	Forested ecoprovinces			Nonforested ecoprovinces			All ecoprovinces		
	Within parks	Outside parks	Total[a]	Within parks	Outside parks	Total[a]	Within parks	Outside parks	Total[a]
General outdoor activities	56 393 811 (39.2)	87 308 189 (60.8)	143 702 000	12 441 555 (55.7)	9 910 445 (44.3)	22 352 000	68 835 367 (41.5)	97 218 633 (58.5)	166 054 000
Wildlife study	4 993 606 (44.8)	6 157 394 (55.2)	11 151 000	1 944 387 (60.2)	1 284 613 (39.8)	3 229 000	6 937 993 (48.2)	7 442 007 (51.8)	14 380 000
Fishing	6 484 232 (23.6)	20 973 768 (76.4)	27 458 000	1 282 375 (32.4)	2 670 625 (67.6)	3 953 000	7 766 607 (24.7)	23 644 393 (75.3)	31 411 000
Hunting[b]	0	12 850 000 (100)	12 850 000	0	1 689 000 (100)	1 689 000	0	14 539 000 (100)	14 539 000

[a]Totals exclude values for ecoprovinces for which the estimates were not releasable because the level of variability in the data was too high.

[b]The survey did not request information from respondents about hunting activity in parks and protected areas. It was assumed that hunting is not permitted in parks and protected areas and that all hunting activity took place outside these areas.

Source: National Survey on the Importance of Nature to Canadians—1996.

Table 5. Population and level of participation in outdoor recreation (as user days) in forested and nonforested ecoprovinces in 1996

	No. (and %) of people or user-days		
	Forested	Nonforested	Total
Population	18 558 712 (64.4)	10 280 206 (35.6)	28 838 918 (100)
General activities	143 702 000 (86.5)	22 352 000 (13.5)	166 054 000 (100)
Wildlife study	11 151 000 (77.5)	3 229 000 (22.5)	14 380 000 (100)
Fishing	27 458 000 (87.4)	3 953 000 (12.6)	31 438 000 (100)
Hunting	12 850 000 (88.4)	1 689 000 (11.6)	14 539 000 (100)

Sources: National Survey on the Importance of Nature to Canadians—1996 and Statistics Canada Census data.

spp.), white cedar (*Thuja occidentalis*), paper birch (*Betula papyrifera*), and basswood (*Tilia* spp.). Urban development is extensive in this ecoprovince. The region includes the following towns and cities: Québec, Trois-Rivières, Montréal, the Ottawa–Gatineau area, Cornwall, Gananoque, Brockville, Kingston, Peterborough, Kitchener, Waterloo, and Barrie. This is the most populated forest ecoprovince (with 8.3 million people), and it has one of the highest population densities in Canada (1.53 ha/resident) (Table 3). The high population levels are likely the reason that this ecoprovince also has the highest absolute levels of outdoor recreation activity. The fact that almost one-third of this ecoprovince is covered by water (Table 3) may also contribute to the high levels of recreation activity, because access to water is an important attribute for many types of outdoor recreation.

The Southern Boreal Shield is situated north of the Great Lakes–St. Lawrence Lowlands (Fig. 1). It runs from Wawa in the west to about Québec in the east. The climate is characterized by warm summers and cold, snowy winters. The forests of this ecoprovince are diverse. Species in evidence include the usual boreal forest species (white spruce, balsam fir [*Abies balsamea*], eastern hemlock, jack pine [*Pinus banksiana*], black spruce [*Picea*

Table 6. Level of participation in outdoor recreation activities in 1996 by forested ecoprovince of destination

Code	Name	No. of user-days				
		General outdoor activities	Wildlife study	Fishing	Hunting	Total
6.1	Western Boreal Shield	483 000[a]	NR	200 000[a]	NR	NR
6.2	Mid-Boreal Shield	2 439 000	75 000[a]	1 456 000	810 000[a]	4 780 000
6.3	Eastern Boreal Shield	3 229 000	651 000[a]	1 165 000	837 000[a]	5 882 000
6.4	Newfoundland	4 310 000	389 000[a]	1 609 000	1 093 000	7 401 000
6.5	Lake of the Woods	4 303 000	NR	830 000[a]	216 000[a]	NR
6.6	Southern Boreal Shield	28 630 000	2 172 000[a]	6 014 000	2 292 000	39 108 000
7.1	Appalachian–Acadian Highlands	7 199 000	770 000[a]	1 471 000	1 219 000	10 659 000
7.2	Northumberland Lowlands	4 671 000	479 000[a]	591 000	626 000	6 367 000
7.3	Fundy Uplands	7 353 000	699 000	1 305 000	1 397 000	10 754 000
8.1	Great Lakes–St. Lawrence Lowlands	34 734 000	3 134 000	6 359 000	2 125 000	46 352 000
9.1	Boreal Foothills	1 056 000	NR	298 000[a]	146 000[a]	NR
9.2	Central Boreal Plains	6 569 000	335 000[a]	1 184 000	687 000	8 775 000
9.3	Eastern Boreal Plains	1 283 000	NR	320 000[a]	139 000[a]	NR
13.1	Georgia Depression	14 336 000	1 303 000	1 787 000	174 000[a]	17 600 000
13.2	Southern Coastal Mountains	4 560 000	373 000[a]	578 000[a]	98 000[a]	5 609 000
14.1	Northern Montane Cordillera	856 000[a]	NR	214 000[a]	NR	NR
14.2	Central Montane Cordillera	1498 000[a]	NR	275 000[a]	108 000[a]	NR
14.3	Southern Montane Cordillera	6 054 000	NR	850 000[a]	167 000[a]	NR
14.4	Columbia Montane Cordillera	9 411 000	770 000[a]	846 000[a]	685 000	11 712 000
G1	Northern Transition Forest[b]	297 000[a]	NR	NR	NR	NR
G2	Taiga / Boreal Cordillera Forest[c]	432 000[a]	NR	106 000[a]	34 000[a]	NR

[a] Estimate has a high sample variability (coefficient of variation in the range 16.6% to 33.3%).

[b] Comprises ecoprovinces 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4, and 15.2.

[c] Comprises ecoprovinces 11.2, 11.3, 11.4, 12.2, 12.3, and 12.4.

Source: National Survey on the Importance of Nature to Canadians—1996.

Note: NR = not releasable (estimate did not meet release criteria).

mariana], tamarack, birch, and poplar), as well as sugar maple, white and red pine, beech, and ash. The forest industry accounts for a significant proportion of the economy of this ecoprovince, and agriculture accounts for a very small proportion of the land area. The other main land uses include mining, hydroelectricity, and tourism and recreation. The main communities in this ecoprovince are Témiscaming, North Bay, Maniwaki, Wawa, Sault Ste. Marie, Elliot Lake, Sudbury, and Shawinigan. Factors that contribute to high rates of outdoor recreation in this area include extensive areas of uninterrupted forest cover, relatively low population density, a significant percentage of the area protected in established parks, and proximity to large population centers such as Toronto, Ottawa, Montréal, and Québec.

The Georgia Depression covers the eastern part of Vancouver Island, the Gulf Islands, and the lower mainland of British Columbia (Fig. 1). The area has a Mediterranean-type climate with warm summers and mild but wet winters. The main forest species in this area are Douglas-fir (*Pseudotsuga menziesii*), western hemlock (*Tsuga heterophylla*), and grand fir (*Abies grandis*). In this very densely populated area, competition for land is significant. Land uses include timber production in mountainous and higher-elevation areas and residential development, industrial land use, recreation, and agriculture in lower-elevation areas and valley bottoms. Major communities include Victoria, Port Alberni, Campbell River, Nanaimo, Saltspring Island, Vancouver, Chilliwack, Abbotsford, and Mission. Local factors that may contribute to high levels of recreation activity in this ecoprovince are high population levels, favorable climatic conditions, scenic beauty, proximity to the ocean, and presence of temperate rain forest conditions and large trees in mature old-growth forests.

In general there was a correspondence between the level of recreation activity and ecoprovince population (Table 6). This is not surprising because most destinations in a recreationist's choice set are probably within a day's drive of the individual's residence. However, it is also interesting to examine levels of recreation activity without population effects, for example, by analyzing recreation activity on a per capita basis (Fig. 2).

The highest per capita recreation activity occurred in the group of ecoprovinces designated as the Taiga/Boreal Cordillera Forest or Group 2 (Fig. 1). This area comprises most of the Taiga Cordillera ecozone and the Boreal Cordillera ecozone (a major portion of the Yukon Territory and north-central and northwestern British Columbia). Summers are warm to cool with long daylight periods, and winters are long and cold. Vegetation ranges from tundra in the north, to open woodland or taiga in the central portions, to closed-canopy forests in southern regions. Common tree species include white spruce, birch, poplar, and lodgepole pine (*Pinus contorta*). Wildlife populations are diverse and abundant. The terrain in this area is generally mountainous.

The second highest per-capita recreation participation occurred in the Columbia–Montane Cordillera. This area covers the southern portions of the Columbia Mountains and the Rocky Mountains in southwestern Alberta and southeastern British Columbia. The terrain is mountainous, and the area includes a rich mosaic of ecosystem types, including fragile alpine, subalpine, and montane ecosystems, the latter with mature forests. Provincial and national parks in the area include Mount Robson, Yoho, Kootenay, Glacier, Banff, Jasper, Willmore Wilderness, and Waterton Lakes. Major communities include Revelstoke, Nelson, Blue River, Creston, Field, Jasper, Banff, Lake Louise, Trail, Castlegar, Cranbrook, Kimberley, Invermere, Golden, and Fernie.

The third-highest per-capita participation occurred in the Lake of the Woods ecoprovince. This ecoprovince is characterized by boreal forest type ecosystems on generally well-drained sites with numerous bare-rock outcroppings. The area has a number of rock-bound lakes typical of the Canadian Shield. Major land uses are forestry, recreation, and hunting, but agriculture is minimal. The major communities include Kenora, Dryden, Fort Frances, and Thunder Bay. The area is popular for water-based outdoor recreation activities.

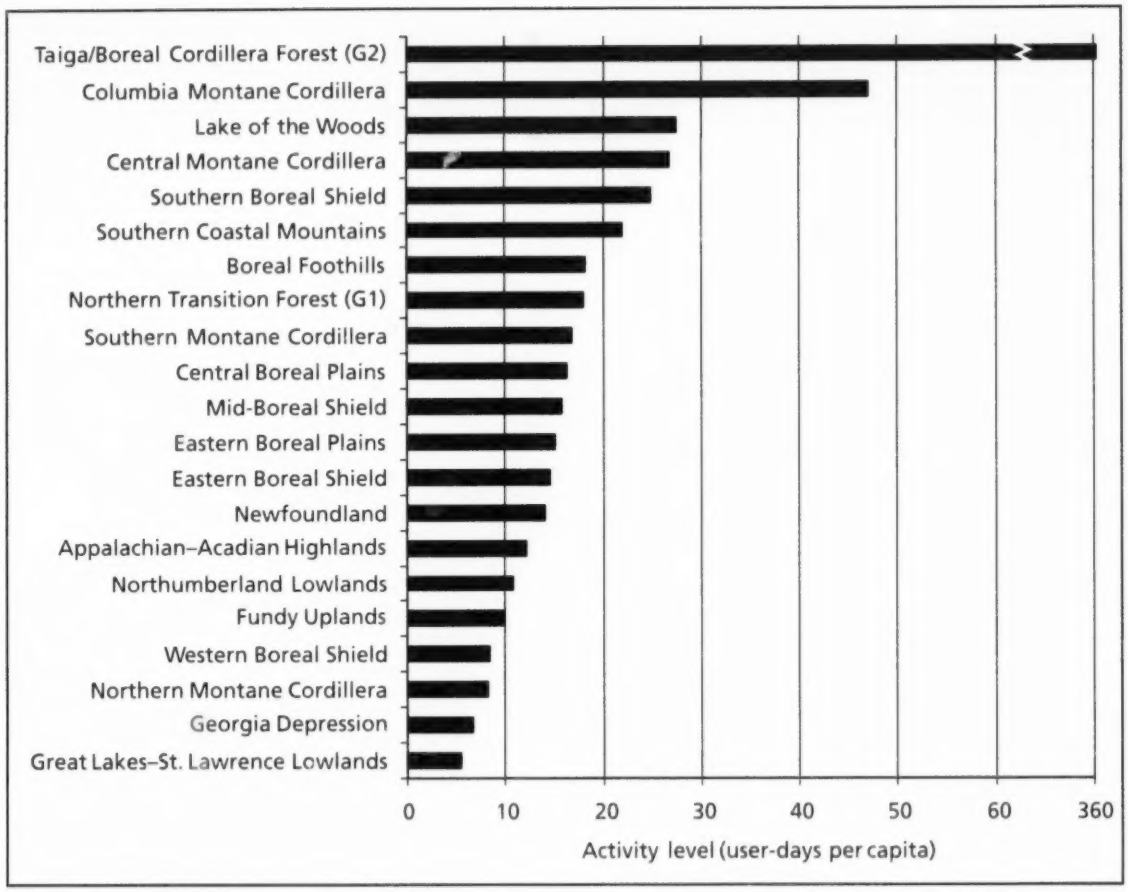

Figure 2. Per capita activity levels in the forested ecoprovinces of Canada in 1996. Northern Transition Forest (G1) = ecoprovinces 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4, and 15.2. Taiga/Boreal Cordillera Forest (G2) = ecoprovinces 11.2, 11.3, 11.4, 12.2, 12.3, and 12.4. Data sources: National Survey on the Importance of Nature—1996 and Statistics Canada Census data. User-days per capita was determined by dividing the row sums from Table 6 by the 1996 population for the ecoprovince. Therefore, user-days per capita for an ecoprovince does not include activity levels for categories with nonreleasable estimates. For example, the total number of user-days for the Western Boreal Shield (ecoprovince 6.1) is assumed to be 683 000, and the levels of activity for wildlife study and hunting are assumed to equal zero.

There are two principal reasons for higher-than-average per capita participation rates in some ecoprovinces. First, there is a general tendency for individual residents in some ecoprovinces to spend more of their time in natural areas than individuals in other areas, because there are more opportunities for quality outdoor recreation experiences or because of the general preferences of the population. Second, the features, properties, and characteristics of some ecoprovinces draw relatively more people from other areas (i.e., people travel to these ecoprovinces from other ecoprovinces for recreation experiences).

CONCLUSIONS

Overall levels of outdoor recreation in Canada in 1996 were significant, and opportunities for outdoor recreation existed throughout Canada's forested regions. Outdoor recreation activity was most significant in the most populous ecoprovinces, where competition for land is intense. Therefore, a significant level of human development in an area does not preclude at least some types of recreation experiences. Recreation activity levels may be significant in densely populated ecoprovinces because outdoor recreation activities are in general concentrated in well-defined areas that combine natural environments with a suitable selection of recreation services and facilities.

There were also significant levels of outdoor recreation activity in less-populated areas, where land-use competition is far less intense. In fact, on a per capita basis, recreation activity levels tended to be higher in less-populated regions and lower in densely populated areas. The types of recreation experiences available in remote areas are often different from those in populated areas. For these areas, the demand for outdoor recreation experiences may be less a function of proximity to residence, accessibility, services, and facilities and more a function of wilderness, naturalness, wildlife, and lack of congestion.

Although significant social benefits are associated with opportunities for outdoor recreation, high levels of outdoor recreation can also lead to social costs. For example, outdoor recreation can have significant negative environmental consequences (e.g., higher rates of fire incidence, soil compaction, soil erosion, declines in water quality, decreased wildlife population levels, littering, loss of habitat, and site degradation). Also, high levels of recreation demand in an area can result in congestion or the need to regulate or control use through permits and reservation systems.

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APPENDIX 1

METHODS FOR REGIONAL TABULATIONS OF PARTICIPATION IN OUTDOOR RECREATION

Phase 1: National Survey on the Importance of Nature to Canadians—1996

The original data source for this report was the National Survey on the Importance of Nature to Canadians—1996. The NSINC—1996 was a comprehensive survey of outdoor nature-based activities in Canada, conducted by Statistics Canada on behalf of the Federal–Provincial–Territorial Task Force on the Importance of Nature to Canadians. The sponsors of the survey included all 10 provinces, Yukon Territory, and various departments of the Government of Canada. The 1996 survey was a continuation of the Surveys on the Importance of Wildlife, conducted in 1981, 1987, and 1991, but the 1996 survey covered a broader range of outdoor nature-based activities, as well as destination-based information.

The NSINC—1996 was included as a supplement to the monthly labor force survey for which the sampling framework is designed to be representative of all regions and demographic groups in Canadian society. The sample size was 86 951 (Filion et al. 1999), and a total of 60 789 usable responses (69.9%) were obtained. A database was created from individual responses to the questionnaire, supplemented by selected information from the labor force survey. The complete database includes confidential personal information, and as such it is not available for public distribution; however, a public-release database, which excludes confidential personal information on respondents, is available. The database is available from Statistics Canada Client Services. The database includes a set of weights that are based on the sampling framework and that permit estimation of population values from the individual responses.

Filion et al. (1999) provided a general summary of the survey method. More detailed information about the questionnaire design, sampling framework, data collection and processing procedures, data quality control, sampling variability, and tabulation guidelines appeared in Statistics Canada (1997).

Phase 2: Obtaining Estimates at the Ecoprovince Level

The NSINC—1996 was a household survey, and therefore the location of each respondent's residence was known. To obtain information on destinations for nature-based activities, respondents were asked to indicate the province where the activity took place, as well as the name of the nearest city, town, or village. Additional information collected for individual destinations included whether the destination was in a park or other protected area, estimated distance from the respondent's residence, number of trips to the destination, and total number of days spent at the destination.

The next step in developing estimates for regional destinations such as ecoprovinces was to determine the appropriate standard geographic classification (SGC) code for each destination specified. The SGC code is a 7-digit code indicating province, Census Division, and Census Subdivision. Statistics Canada matched the names of destinations provided by respondents against a master file of place names. This automated procedure yielded SGC codes for 80% of the responses. Georeferencing of the remaining 20% of the destinations was done manually.

Statistics Canada then allocated the SGC codes to ecoprovinces by overlaying the ecoprovince boundary files with geographic files for SGC codes and determining the correlations between SGC codes and ecoprovinces.

Finally, population estimates for total number of days of participation, total numbers of days

within and outside parks or protected areas, and distance traveled were developed by Statistics Canada for each of four activity categories (general outdoor activity, wildlife study, fishing, and hunting) in each ecoprovince. These population estimates were obtained by multiplying sample observations in a particular ecoprovince by the sample weight. Statistics Canada did not screen the resulting data file (i.e., no tests were done to ensure that the population estimates conformed with Statistics Canada criteria for release of data). In addition, the results were not adjusted to account for nonresponses. Therefore, after transfer of the data file to the Canadian Forest Service, the data were screened and adjusted for nonresponses (see below).

Phase 3: Screening Estimates for Releasability

For each population estimate developed from sample observations, a measure of sampling variability can be derived. This measure forms the basis for Statistics Canada requirements for release of population estimates. The measure of sampling variability used to screen NSINC—1996 estimates was the coefficient of variation. According to Statistics Canada criteria, if a population estimate has a coefficient of variation ranging from 0% to 16.5%, it can be released without restriction. If the coefficient of variation is in the range 16.6% to 33.3%, the estimate can be released but should be flagged to indicate the high level of error associated with the estimate. If the coefficient of variation exceeds 33.3%, Statistics Canada recommends against release. These criteria were used to screen the population estimates for each ecoprovince (see Table 6).

Phase 4: Imputing Values to Account for Nonresponse

For some questionnaires, responses were incomplete. For destination-related questions, there were two sources of non-response: either the respondent indicated that he or she spent some time on an activity at a particular destination but failed to identify the location or the respondent specified the destination but failed to report the number of days spent there. The population estimates supplied for this analysis were not adjusted for such nonresponses. Therefore, values were imputed to account for the two sources of nonresponse by redistributing the number of participants (where destinations were not specified) and the number of days (where duration of stay was not specified) on the basis of the distribution for these variables for participants who provided complete responses.

Phase 5: Grouping Forested Ecoprovinces

For certain groups of forested ecoprovinces, the sampling variability was consistently too high to allow release of the data. These ecoprovinces tended to be in more remote areas, where activity levels were relatively low. However, in some cases ecoprovinces could be grouped and a single estimate derived for the group, for which the coefficient of variation was low enough to allow release of the group estimate.

By this process, two groups of forested ecoprovinces were created for which population estimates were releasable. Group 1 encompassed ecoprovinces 4.1, 4.2, 4.3, 5.1, 5.2, 5.3, 5.4, and 15.2, which are generally situated along the northern transition of Canada's forests. This group of ecoprovinces was referred to as the Northern Transition Forest, and its alphanumeric code was G1. The second group comprised ecoprovinces 11.2, 11.3, 11.4, 12.2, 12.3, and 12.4, situated in the northwest portion of Canada's forested area. This group of ecoprovinces was referred to as the Taiga/Boreal Cordillera Forest, and its alphanumeric code was G2.